

EF-21 Effectiveness Strategic Plan Goal

Implementation Activity: SPAR Model Development Program (RES/DRASP)

Primary FY 04-09 Strategic Plan Goal: Ensure that NRC actions are effective, efficient, realistic, and timely.

Strategy 1: Use state-of-the-art methods and risk insights to improve the effectiveness and realism of NRC actions.

Strategy 4: Use realistically conservative safety-focused research programs to resolve safety-related issues.

Strategy 8: Make timely regulatory decisions.

Secondary FY 04-09 Strategic Plan Goal: Ensure protection of public health and safety and the environment.

Strategy 3: Use sound science and state-of-the-art methods to establish risk-informed and, where appropriate, performance-based regulations.

Strategy 5: Evaluate and utilize domestic and international operational experience and events to enhance decision-making.

Strategy 6: Conduct NRC safety oversight programs, including inspections and enforcement activities, to monitor licensee performance.

Primary Priority: High

Secondary Priority: Medium

The Office of Nuclear Regulatory Research (RES) is developing risk assessment models known as Standardized Plant Analysis Risk (SPAR) models. SPAR models are plant-specific probabilistic risk assessment (PRA) models that model accident sequence progression, plant systems and components, and plant operator actions. The standardized models represent the as-built, as-operated plant. The SPAR models permit the NRC staff to perform risk-informed regulatory activities by independently assessing the risk of events or degraded conditions at operating nuclear power plants. SPAR models for internal initiating events during full-power operation are available for all 104 operating commercial nuclear power plants in the United States. Fifteen of the 74 internal events models have been expanded to include external initiating events (fires, floods, seismic events, high winds, etc.). Two models for internal initiating events during low-power and shutdown (LP/SD) operations have been developed and are available for trial use. Two models are currently being extended to include containment systems and plant damage states to support large early release frequency (LERF)/Level II analysis. Additional integration of external events models, low-power shutdown models and LERF/Level II models scheduled to be developed in 2008 and 2009 are currently being coordinated with the Office of Nuclear Reactor Regulation (NRR).

Enhancements to the internal events (Level 1), Revision 3 SPAR models are currently being implemented. This is being accomplished through two separate efforts. The first effort involves incorporating the resolution of modeling issues that have been identified from the results of onsite quality assurance reviews of the Revision 3 SPAR models, the results of the comparison exercise conducted with the pilot plants in the Mitigating Systems Performance Index (MSPI) Development Program, and feedback from model users. The second effort involves performing a cut-set level review of Revision 3 SPAR models against the respective plant's probabilistic risk assessment (PRA), in a manner similar to the review performed during the comparison exercise conducted with the pilot plants in the MSPI Development Program.

RES has executed an addendum to a memorandum of understanding with the Electric Power Research Institute to conduct cooperative nuclear safety research for PRA. Several of the initiatives included in the addendum are intended to help resolve key technical issues that affect both the NRC SPAR models and licensee PRAs. The objective of this effort is to work with the broader PRA community to resolve PRA issues and develop PRA methods, tools, data, and technical information useful to both the NRC and industry. The agency has established working groups that include support from NRR, the Office of New Reactors, and the regional offices.

The staff is currently using SPAR models to support the State-of-the-Art Reactor Consequence Analysis (SOARCA) project. The staff is using Revision 3.31 SPAR models for the plants selected, along with other sources of PRA information to identify accident sequences that will be evaluated for their potential offsite consequences. The staff plans to update the SPAR models as appropriate based on insights gained through this project. In addition, the staff will update the SPAR models, as appropriate and on a plant-by-plant basis, to include plant safety enhancements resulting from Phases 1, 2 and 3 Section B.5.b assessments as the engineering and risk information on the pertinent systems become available to the staff as part of normal NRC regulatory activities.

SPAR models are used to: (1) evaluate the risk significance of inspection findings in SDP Phase 3 analyses; (2) evaluate risk associated with operational events and degraded conditions in the ASP Program; (3) identify modeling issues that are risk-significant and rank and prioritize these issues as part of the PRA quality efforts (e.g., as part of RG 1.200); (4) support generic safety issue resolution (e.g., GSI-189 and GSI-191) by screening (or prioritizing), performing detailed analysis to determine if licensees should be required to make changes to their plants, assessing whether NRC should modify or eliminate an existing regulatory requirement, and doing flexible and quick analyses using minimum resources to perform generic studies; (5) perform analyses in support of the staff's risk-informed review of license amendments (e.g., tech spec changes, Notice of Enforcement Discretion (NOED), fire protection requirements); and (6) independently verify the Mitigating Systems Performance Index (MSPI).

The Risk Assessment of Operating Events Handbook, commonly referred to as the RASP Handbook (Risk Assessment Standardization Project) is currently being revised and updated. The RASP Handbook provides standard methods and guidelines for evaluating operational events and degraded conditions using the SPAR models. The Handbook also provides guidance on consensus review for major decisions and high-risk events. The review verifies that both the licensee and the NRC are using state-of-the-art approaches and complete plant information, demonstrating that risk-informed regulatory decisions are based on the as-built and as-operated plant.

Project accomplishments over the past 6 months

- Cut-set levels reviews completed on 17 SPAR models
- Browns Ferry Unit 1 Interim Model to support May '07 restart
- Initiated revised Level 2/LERF model development
- RES/EPRI MOU Addendum to address resolution of key technical issues with industry
- Resolution of OIG Audit Issues
- Completed 6 external events models (two models used to support SOARCA)
- Completed 2 new next generation LP/SD models

Noteworthy Planned Activities	
Major Milestones	Target Completion Date
Resolve key technical issues (FY08 & FY09)	FY 2009
Complete initial cut set level review of SPAR models	09/2008
Extend Level 1 SPAR Models to incorporate containment systems for 6 additional plant classes	05/2008
Complete SPAR LERF models for 8 plant classes for trial use	06/2008